Antarctic Logistics for Earth Sciences

The United States and about 12 other nations support continuous earth sciences programs in Antarctica. These range from station geophysics at a single coastal location to the complex mixes of many aspects of geology, geophysics, and cartography that are mounted by the United States and the USSR every year ranging over much of the continent. Year-round stations are maintained at 29 locations on the coast and three interior places from which seismic, magnetic, and gravity measurements can be made on a continuous basis. Marine geophysics (including gravity, magnetics, and reflection and refraction seismic) and marine geology (including dredging and coring) are supported from a variety of research ships and icebreakers. Some of these same types of surveys are also supported by tracked vehicles and aircraft from locations on fast sea ice. Geologic and geophysical research on the continent are supported on oversnow traverses by tracked vehicles or, more frequently, from temporary camps by fixed-wing, ski-equipped aircraft and by helicopters. In the United States program, approved projects are given grant funds to cover salaries and direct expenses, plus transportation from California to Antarctica, all food, field clothing, camp equipment and supplies, transportation to field locations, and movement in the field area by tracked vehicle, motor toboggan, or man-hauled sled. During fiscal year 1978 (1977-78) U.S. funds available for support of Antarctic science were $6,475,000 and to cover the costs of logistic support for this science were $41,758,000. Much of the logistics funds were used to contract for logistic support from the U.S. Navy, the U.S. Coast Guard, and a private corporation, Holmes and Narver.

URBAN, JAMES B., and RICHARD HARDING, Univ. Texas-Dallas, Richardson, Tex.

Hydrocarbon Occurrence as Function of Thermal Alteration of Organic Material

Fourteen wells from the Lenora gas field, Dewey County, Oklahoma, have been studied by vitrinite reflectance microscopy to determine maximum paleotemperature and temperature gradients.

Various types of petroleum hydrocarbons (oil, distillate, and gas) are formed at varying temperatures which have been empirically related to the degree of vitrinite reflectance (R_o). R_o values at the depth of petroleum accumulation are consistent with the types of hydrocarbons encountered. Geochemical data obtained from well cuttings indicate that the petroleum originated in surrounding shales. Therefore, the R_o values obtained reflect accurately the maximum temperature to which the petroleum and its precursors were subjected.

Reflectance gradients calculated for each well by taking R_o measurements at several depths in each borehole reveal a gradient anomaly directly over the reservoir when compared to the gradients existing beside the reservoir. The reservoir itself is a small sand lens, possibly of barrier-island or bar origin. It is possible, then, that determination of paleotemperature gradients by vitrinite microscopy and the identification of gradient anomalies in a basin may be useful in the search for new reservoirs.

VAN DEN BARK, E., and O. D. THOMAS, Phillips Petroleum Co., Bartlesville, Okla.

Ekofisk—First of Western European Giant Oil Fields

No abstract available.

VAN HOUTEN, FRANKLYN B., Princeton Univ., Princeton, N.J.

Mid-Cenozoic Fortuna Formation, East-Central Tunisia; Record of Late Alpine Activity on Cratonic Margin of North Africa

The Oligocene–early Miocene paralic to nonmarine Fortuna Formation in east-central Tunisia accumulated in a cratonic basin on adjacent parts of the Tunisian Atlas province and the Pelagian block. This coarsening-upward detrital sequence was derived from west and northwest uplands and reached a maximum thickness of 1,100 to 1,200 m near the northeastern end of its northeast-trending depocenter (graben?) along the boundary between the two crustal blocks.

After early Cenozoic culmination of the Alpine orogeny the Fortuna basin and source area were created during a new phase of extensional deformation that affected the western Mediterranean region. Continued differential uplift and subsidence produced an increasingly sandy Oligocene lower member composed of shallow-marine to deltaic mudstone and fine-grained sandstone, a maximum of 400 to 600 m thick along the central part of the axial trough. Detritus from the uplift was dispersed east and southeast, and the sandstone grades into a marine carbonate facies on the Pelagian shelf on the east.

Accentuated vertical displacement of basin and source area produced the increasingly coarser grained fluvial upper member (lower Miocene) that was dispersed mainly east and northeastward. This member has a maximum thickness of 850 m near the northeastern end of the trough. Stringers and lenses of conglomerate in the upper part contain well-rounded pebbles of quartz, chert, and quartzite, as long as 4 cm near the northwestern border and 2 cm along the axial depocenter. Accumulation of the Fortuna Formation terminated abruptly, followed by a widespread late early Miocene marine transgression.

Fortuna basin and its northwestern upland on the unstable cratonic margin of North Africa responded to remote effects of late Alpine activity. Early Oligocene to Pliocene sediments in the Fortuna basin area reflect each episode of deformation, regression, and transgression that dominated the western Mediterranean.

VAN OVERMEEREN, F. A., Teknica Inc., Calgary, Alta., and D. E. FOULKES, Teknica Inc., Houston, Tex.

Walker Creek Field, Arkansas—Smackover Case History

Walker Creek field is a stratigraphic trap containing 100 million bbl of oil and 100 Bcf of gas. The field lies